ARTIFICIAL LEGS, ARMS,

AND

APPARATUS

FOR

DISABILITIES AND DEFORMITIES,

INVENTED AND MANUFACTURED

BY

D. W. KOLBÉ,

MANUFACTURER OF SURGICAL AND ORTHOPÆDIC INSTRUMENTS,
ARTIFICIAL LIMBS, ETC. ETC.

NO. 15 SOUTH NINTH STREET,

PHILADELPHIA, PA.

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ARTIFICIAL LIMBS

INVENTED AND MANUFACTURED

By D. W. KOLBÉ,

Orthopædic Mechanician and Manufacturer of all Kinds of Surgical Instruments; and, by appointment, Orthopædic Mechanist to the Philadelphia Orthopædic Hospital.

No. 15 SOUTH NINTH STREET,

PHILADELPHIA, PA.

We beg leave to call the attention of officers, soldiers, and sailors of the army and navy of the United States to our improvement on artificial legs, arms, and apparatus for disabilities and deformities, the result of injuries and wounds. They are furnished under an Act of Congress, approved June 17 and 30, 1870, and we have given bond, according to the requirements of that act, for the faithful performance of our duty to those who may favor us with their patronage. To facilitate the interests of those having claims upon the Government for artificial limbs, we are prepared to furnish blank forms of application by mail to any person addressing us at our place of business.

As a guarantee to our patrons of our capability to give entire satisfaction we need only to call attention to the fact that we have made a specialty of this branch of the art for the last thirty-three years. Ten years were spent in the most celebrated workshops of Germany, Belgium, and Paris, and twenty-three years in the United States. In this period we have gained the confidence and patronage of the leading surgeons in this country, who have testified their appreciation of our efforts by permitting their names as reference, and referring to us in terms of commendation in their works on surgical science.

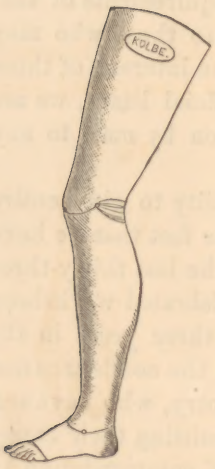
These warm testimonials to our labors have rendered it entirely useless for us to follow the now antiquated and absurd custom of presenting any array of testimonials from the wearers of our

limbs as to their efficiency. This question has been definitely settled by the appointment of boards of surgeons by the army authorities, and by civil practitioners, whose decisions as to the relative merits of our limbs have been sufficiently gratifying and encouraging to lead us to believe that those needing them will be influenced in their choice by professional experts, who have devoted years to the study of this branch of mechanical surgery. We simply ask, therefore, those who desire artificial appliances —limbs, apparatus for deformities, &c.—to call at our store and examine the limbs themselves. The comparison can then be made between our work and that of other manufacturers. We regard this rather to be the crucial test of superiority than general impressions of uninformed persons.

We propose to present first the cuts of our limbs for amputation above the knee and below the knee:—

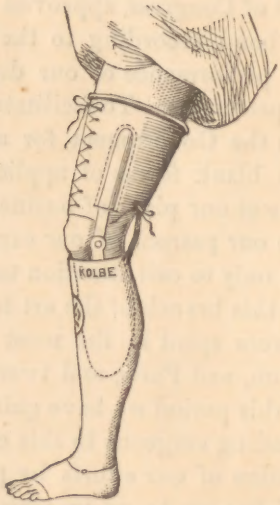
In Fig. 1 is shown the complete limb for amputation above the knee. It is the best appliance that has as yet been devised for

Fig. 1.



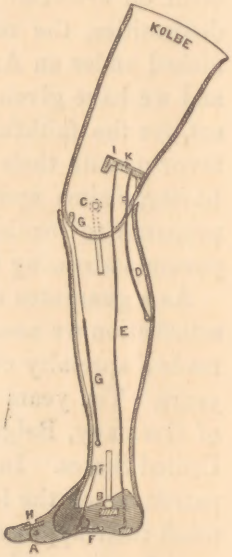
Kolbé's limb for amputation above the knee.

Fig. 2.



Kolbé's limb for amputation below the knee.

Fig. 3.



Vertical section of perfect limb.

supplying the loss of the natural member. Its action is in perfect imitation of the functions of the natural limb, and this is effected in the most simple manner, as shown in Fig. 3.

As is usual, the framework is of willow wood, which is selected for its tenacity, strength, fine grain, and is covered with raw-hide (specially prepared for that purpose); its external appearance is of a flesh-color, waterproof enamelled; the thigh-piece, or bucket, fitting the thigh accurately, and extending up to the ischium and perineum, which sustains a part of the weight of the body, the balance being diffused over the outer surface of the thigh. Its walls are opened by oblong slits or fenestræ, which permit a due amount of ventilation, and at the same time allow the secretions of the part to escape. The thigh-piece is strongly articulated at the knee to the leg-piece by a steel bolt, which permits antero-posterior motion only. From the inner surface of the lower third of the bucket a wooden pin, I K, projects, to which are attached two strong cords made of twisted linen thread. One of these, I E, being inserted into the heel, represents the tendo-Achillis; it supports the weight of the body by preventing the foot being bent at any greater angle than a right angle. The other cord, K D, is inserted into the middle of the posterior surface of the leg, and is accessory to the former, an arrangement by which the limb is rendered so exceedingly strong that the weight of the strongest man cannot injure its stability; the cord marked G G is a spring which is intended to give the leg a slight impulse forward in taking a step; it is the analogue of the extensor quadriceps of the natural limb.

Fig. 4 shows the mechanism of the ankle-joint. It is somewhat peculiar, combining all the strength of a ginglymoid joint with lateral motion. The inferior surface of the leg and the corresponding surface of the foot are provided each with a hemispherical depression, which, when conjoined, form a hollow sphere; in the interior of this sphere the globular enlargement seated at the centre of the steel ankle-bolt works, the extremities of the bolt passing through the lateral metal straps in holes a little larger than their diameter; these extremities are sustained by two pieces of India-rubber, which permit that amount of lateral motion desirable in the ankle. F F, in Fig. 3, indicate the position of a cord attached to a hori-

Fig. 4.

zontal spring fastened to the sole of the foot, and intended to bring the foot again to a rectangular position with the leg after it has been extended; it is the analogue of the tibialis anticus. H A mark the metatarso pharyngeal joint; it is a simple tenon and mortise joint, firmly bolted together, and under the control of a spring which brings the toes straight with the foot after they have been extended by the weight of the body.

The artificial leg, Fig. 2, for amputation below the knee, is constructed in the same substantial manner as above described. No artificial means are needed for the antero-posterior motion of the knee-joint.

We shall now present, by way of illustration, selected from a large number, the drawings of two cases in which my limbs were used with perfect success:—

Fig. 5.

Amputation through knee and leg.
(Accurate copy of photograph.)

Fig. 6.

Artificial limbs applied.
(Accurate copy of photograph.)

Fig. 5 shows a patient with both legs removed, one through the knee and the other below. The stumps were of peculiar form and unusually tender, being surrounded with cicatrices caused by sloughing.

Fig. 6 is the patient with the limbs applied.

Fig. 7 shows a young man who had both legs cut off below the knee, and who for fifteen years crawled along on knee-pads, in consequence of which the knees were deformed and contracted, the stumps had undergone sloughing, leaving the end of the bones projecting and barely covered with skin, as represented in the cut.

Fig. 8 shows the patient with the limbs applied.

The success in both these cases was as complete as it was surprising, and left nothing desirable that art could supply.

Fig. 7.

Amputation through both legs.
(Accurate copy of photograph.)

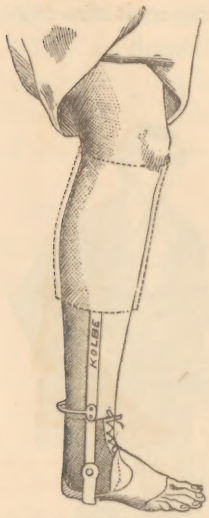
Fig. 8.

Artificial limbs applied.
(Accurate copy of photograph.)

For further confirmation of the perfect adaptability and superiority of my limbs, I shall quote an extract from Wales's *Mechanical Therapeutics*, a work the reputation of which is thoroughly established in the medical profession. He says that "Kolbé, of Philadelphia, has devised a leg in many respects superior to that of others. It possesses slight lateral motion of the ankle, enough to relieve the strain upon the thigh-sheath when the person steps upon an irregular or an inclinal surface; while, at the same time, it does not render the walking unstable, as it must do if too great an amount of motion is given to the ankle. The external finish and strength of the limb give it rank with the best automatic appliances now offered for the patronage of the maimed, and one great recommendation it possesses is, that

it may be adapted to every form or length of stump. Its mechanism is so simple that the wearer of the limb can in general be his own repairer should any portion of it give out or need overhauling, and this is no small advantage to persons residing at a distance from the manufacturer."

Fig. 9.

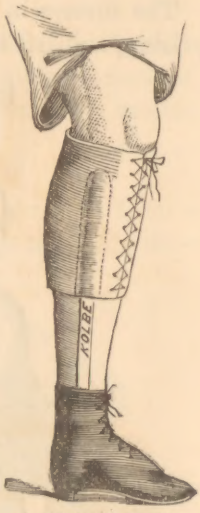


Artificial foot with support below the knee.

Figs. 9, 10, 11, and 12 illustrate Kolbé's artificial foot, used after Syme's, Chopart's, Hey's, and Pirogoff's operations.

The perfection attained in the construction of this peculiar artificial substitute has overcome the numberless objections made against the above-named operations. It as fully supplies the important necessity of comfort in locomotion, etc., as can be expected of any other artificial limb when amputation is performed anterior to the insertion of the flexors of the foot.

Fig. 10.



Artificial foot with shoe applied.

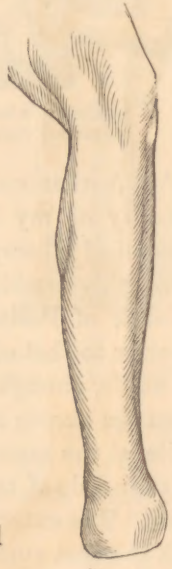
Fig. 11.

Artificial foot without support taken from the knee.

Fig. 12.

Artificial foot with shoe applied.

Fig. 13.



Stump.

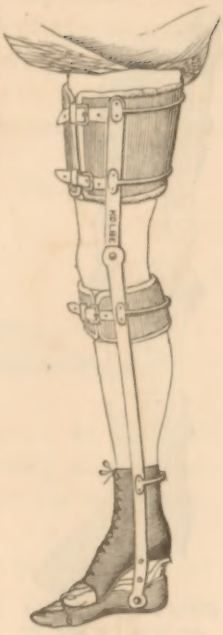
In many cases the artificial foot as represented in Fig. 11 is preferable.

Fig. 14.

Artificial foot with support below the knee.

Figures 14 and 15 illustrate Kolbé's artificial foot to supply the deficiency of a shortened limb. A boot or a laced shoe is worn over the natural and artificial foot, which conceals the deformity.

Fig. 15.



Artificial foot with support above and below the knee.

Fig. 16.

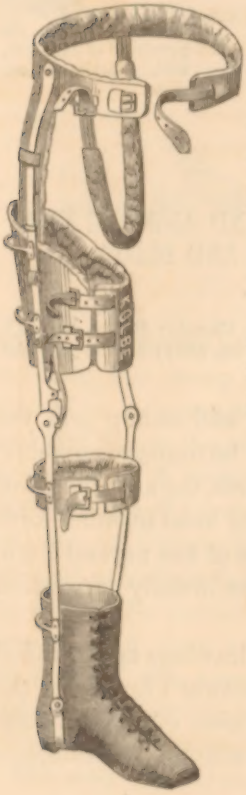


Figure 16 illustrates Kolbé's apparatus for dislocation of hip-joint, ununited fracture of the neck of the femur, and resection at the upper part of the thigh.

Figure 17 illustrates apparatus for ununited fracture or resection below the knee.

Fig. 17.

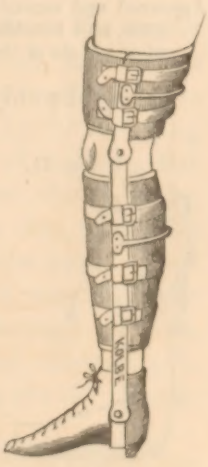
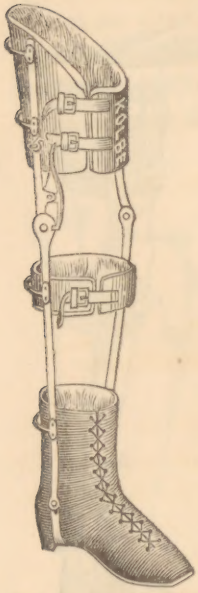
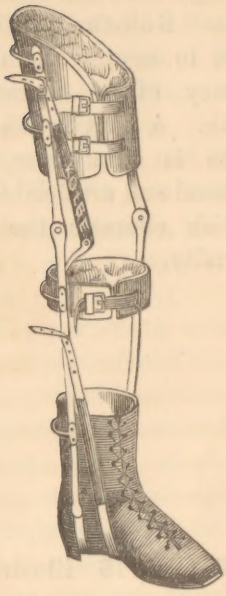


Fig. 18.



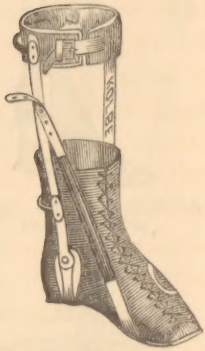
Kolbé's apparatus for paralysis for one or both limbs, with spring lock at the knee-joint.

Fig. 19.



Kolbé's apparatus for paralysis for one or both limbs, with elastic extension.

Fig. 20.



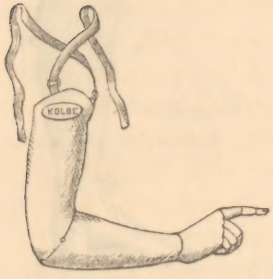
Kolbé's apparatus for paralysis of the foot, with elastic extension.

DESCRIPTION OF KOLBÉ'S ARTIFICIAL HAND AND ARM FOR AMPUTATION AT SHOULDER, ABOVE AND BELOW ELBOW AND AT WRIST.

Approved and commissioned by the Surgeon-General's Circular Order, May 13, 1865, and furnished (by special contract, January 28, 1867) to the maimed of the State of Georgia.

This is the only combination of the dress and stump arm yet invented, and will be found to combine, in an unusual degree, the advantages of both. The arm and hand together form a perfect imitation of the natural limb, while its usefulness in daily occupation is unequalled.

Fig. 21.



The following drawings are intended to illustrate the outward form and the mechanism of motion of the artificial arm. It can be adapted to stumps of any length.

Figure 21 shows the arm complete for an amputation above the elbow. It performs the various functions of the upper extremity, as flexion, extension of the elbow, moving and grasping of the fingers.

Figure 22 represents an arm for amputation below the elbow and at the wrist-joint; its motions are the same as in the previous case. This arm is of great service in farming, driving horses, and for laboring men in general, as I have so modified the connection of the hand with the forearm that the former may be removed at pleasure,

Fig. 22.

and various useful contrivances substituted, such as a chisel, screw-driver, knife, fork, or spoon, etc., or indeed any tool or implement which the wearer may find useful in his daily occupation.

Fig. 23 shows the hand detached, and Fig. 24 the hand replaced by a pair of nippers. The form of the arm is made of leather

Fig. 23.

Fig. 24.

(specially prepared), and mounted with steel strips. The socket receiving the stump has an agreeably soft feeling, and can be applied to the most tender stumps. The application of power is provided for, in the construction of these limbs, by the following mechanism: A traction-cord, consisting partly of webbing and partly of a well-tempered slip of steel, is attached above by the webbing to the shoulder from the arm opposite that, which the artificial substitute is intended to replace, and below hooks on, by the end of the metallic portion of the cord which runs about the forearm, to a short vertical steel slip running through a slit in the back of the margin of the wrist-plate; thus connecting it with the mechanical arrangements designed to move the fingers, which I shall briefly describe.

The strip of steel at the level of and upon the outer side of the

elbow is articulated with the aid of a metal slide working for its whole length upon a tenon or projecting pin; the upper end of the slide is connected to the webbing or leather strap going to the shoulder: the object of this arrangement is to change the direction of the force when the arm is bent. The mechanical arrangement for moving the fingers is inclosed in a cavity hollowed in the substance of the hand, as shown in Fig 25. It consists of a number of levers of different kinds, arranged in such a manner as to apply the force exercised by the traction-cord to the best mechanical advantage in moving the fingers. From the end of the long arm of the second lever a bar projects upwards to the extent of an inch and a half, and connected by a short coupling, by its proximate end, to an oblique bar fixed to the base of the thumb. A spiral spring runs along each side of the hand, and, acting upon each couple of fingers, keeps them in a position of approximation to the thumb. The fingers are connected with the hand by a transverse bolt; the index and middle fingers, and the ring and little fingers, are coupled together, possessing the first phalangeal joints. As the mechanism thus far described provides only for the extension of the first phalanges, an additional lever, working by an excentric, is placed in the first phalanges, and acts upon the second and third phalanges.

Fig. 25.

The entire mechanism of the hand and arm being of steel, it is not subject to the variations of the atmosphere, as is the case with catgut and similar substances so often employed by others. In warm weather these relax, and control of the hand and arm is almost entirely lost; while in wet weather these substances extract the moisture of the atmosphere and swell, thereby preventing free action of the parts. Owing to these constant changes from atmospheric causes, these materials soon wear out, and the limb becomes more or less useless. By using steel (which is free from these objections), strength, lightness, durability, freedom of motion, and non-liability to atmospheric changes are secured.

The following is an extract from a report of a medical committee on the above described arm:—

His Excellency Charles J. Jenkins, Governor of Georgia:

By a resolution of the General Assembly of the State of Georgia, entitled "a resolution for the relief of soldiers maimed

in the State or Confederate States service, and now resident in this State," assented to Nov. 29th, 1866, the undersigned were appointed a committee to make an examination into the professional merits of "the Kolbé arm," and to report the same to his Excellency the Governor.

In pursuance of said resolution, the committee had the honor, on due deliberation, to present their report relating to "the Kolbé arm."

With a conscientious recognition of the responsibility trustfully imposed upon them, the undersigned committee have entered faithfully into the investigation of the structure, material, plan, and mechanism of "the Kolbé arm," as applicable to both humeral and cubital stumps, comparing it with other implements of a like character, and they further respectfully report that the limb under consideration possesses, by its lightness, strength, simplicity of construction, durability, and efficiency, many advantages over any others that they have examined.

They would call particular attention to the distinguishing peculiarity of this arm, viz., that while it presents all the desirable qualities attaching to the best models of the ordinary "dress arm," it possesses the great advantage of a movable hand, which particular feature in its construction enables the wrist-end to be converted into a socket for the attachment of any and every variety of tool or instrument that the ingenuity of the mutilated person may devise for his convenience and use. This advantage is illustrated in the hook furnished with each of the arms, to be applied, under the provision of the General Assembly's resolutions, in case the arm under consideration be adopted.

Most respectfully submitted by the committee, under resolution of the General Assembly of the State of Georgia.

(Signed) HENRY CAMPBELL, M. D., Augusta, Ga.
R. A. T. RIDLEY, M.D., Lagrange, Ga.
THOS. S. POWELL, M.D., Atlanta, Ga.

January 22, 1867.

Fig. 26.

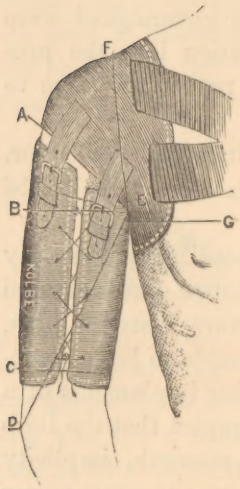


Fig. 26 illustrates Kolbé's apparatus for resections at the shoulder-joint and in the continuity of the humerus. Fig. 27, for resection of the forearm.

Fig. 27.

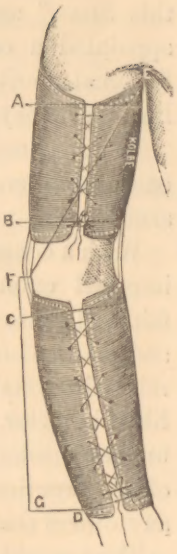
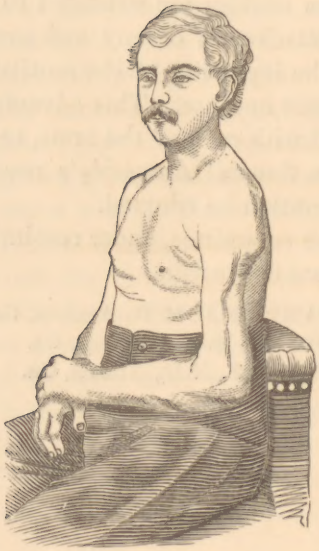
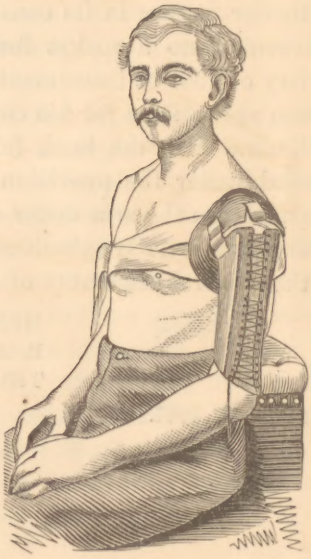


Fig. 28.



Resection of the humerus.
(Accurate copy of photograph.)

Fig. 29.



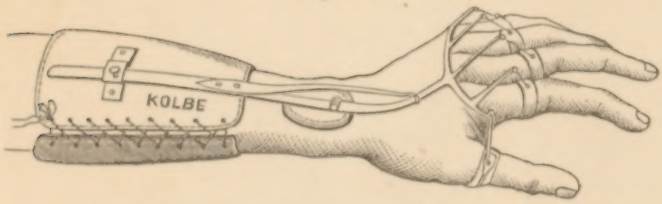
Apparatus applied,
(Accurate copy of photograph.)

Fig. 30.

Paralysis of the extensors of the hand.

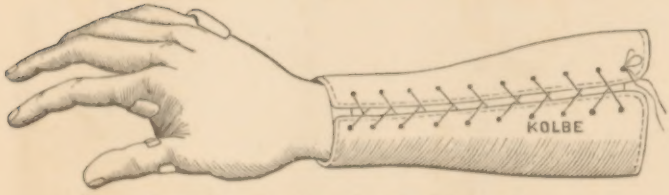
Figs. 31 and 32 illustrate Kolbé's modification of Duchenne and Delacroix's apparatus for paralysis of the extensors of the hand.

Fig. 31.



Apparatus applied on the back of the hand.

Fig. 32.



Apparatus applied on the palm of the hand.